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Truck Crop Production Practices

IMPERIAL COUNTY, CALIFORNIA

Labor, Power, and Materials
by Operation

Farm Production Economics Division
Economic Research Service
U. S. Department of Agriculture

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Previous publications in this group of reports on 1959 truck crop production practices covered the following areas:

Publication No.	Area Covered
ARS 43-132	Columbia County, Wis.
ERS-45	Accomack and Northampton Counties, Va.
ERS-79	Broward and Palm Beach Counties, Fla.
ERS-82	Colquitt County, Ga.
ERS-115	Cameron and Hidalgo Counties, Tex.

Washington, D. C. September 1963

TRUCK CROP PRODUCTION PRACTICES
IMPERIAL COUNTY, CALIFORNIA

Labor, Power, and Materials, by Operation

By

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INTRODUCTION

In 1962 U. S. production of truck crops for fresh market and processing occupied 3.4 million acres of cropland. These crops used slightly more than 1 percent of the total cropland. The farm value of truck crops harvested for sale exceeded $1.2 billion, or an average of $357 per acre harvested. 1/

Although the total acreage of truck crops is small, it is highly concentrated in areas with conditions favorable for production of these crops. The major areas are in California, Florida, Texas, the Eastern Seaboard from Georgia to Long Island, N. Y., the States bordering the Great Lakes, and the Pacific Northwest.

Truck crops in general require intensive labor. These requirements are highly seasonal--with several labor peaks, the highest occurring at harvesttime.

Most truck-crop operations other than land preparation are difficult to mechanize. Thinning and weeding are two preharvest operations still performed largely by hand labor. Harvesting of a majority of truck crops is still predominantly a hand operation. Most of these crops require repetitive pickings, which must be timely, as quality deteriorates very rapidly if the crops are not harvested at the optimum time.

These high labor demands have been difficult to meet particularly during peak periods of weeding, thinning, and harvesting. Most truck-crop areas do not have sufficient local labor available to handle the crops during these periods. This has led many thousands of workers to migrate from one area to another during the peak seasons. In addition, many thousands of foreign workers are imported annually to help satisfy these heavy seasonal labor demands.

1/ U. S. Department of Agriculture Crop Reporting Board. Vegetables - Fresh Market 1962 Annual Summary - Acreage, Production, and Value of Principal Commercial Crops. Vg. 2-2-(62).

U. S. Department of Agriculture Crop Reporting Board. Vegetables - Processing 1962 Annual Summary - Acreage, Production, and Value of Principal Commercial Crops. Vg. 3-2-(62).

Purchased inputs comprise a high proportion of the total inputs in the production of these crops. Most labor is hired. Fertilizer, seed, pesticides, and containers are significant items that are usually purchased. From 1953 to 1962, prices of these inputs increased relative to prices received for truck crops.

To gain further knowledge of some of the inputs involved in production of vegetables, information regarding the 1958-59 crop was obtained from 2,496 vegetable growers in 12 areas.2/ The areas sampled were the counties of (1) Erie, N. Y., (2) Accomack and Northampton, Va., (3) Colquitt, Ga., (4) Broward and Palm Beach, Fla., (5) Cameron and Hidalgo, Tex., (6) Berrien and Van Buren, Mich., (7) Columbia, Wis., (8) Yakima, Wash., (9) Marion, Oreg., (10) Imperial, Calif., (11) Monterey, Calif., and (12) San Joaquin, Calif.

The areas included in the survey were selected on the basis of importance of seasonal and overall production, diversity of crops grown--both for fresh market and for processing--and number and proportion of farmers harvesting truck crops for sale.3/

The survey population was defined as all farmers producing truck crops for sale whose farm headquarters were located within the survey area, except those residing outside the county and more than 20 road miles from their headquarters in the survey area. Within the survey area, a randomized area sampling plan was used to obtain the desired number of respondents.

This is the sixth in a group of 12 publications containing information on labor requirements, production practices, and costs involved in the production of truck crops for fresh market and processing. Information in this report was obtained from 108 producers in Imperial County, Calif. The area studied is shown in figure 1.

A separate report covering all 12 areas will give information on the extent to which production of truck crops has become vertically integrated by either ownership or contractual agreements.

2/ The Crossley S-D Surveys, Inc., under U. S. Department of Agriculture, Agricultural Research Service contract #12-14-100-3826 (43) conducted the field survey and made preliminary tabulations. The author is responsible for the analysis of the data.

3/ Based on data cited in footnote 1 as well as the 1958 annual summaries of the same series; also the U. S. Department of Commerce Census of Agriculture v. I and II, 1954.

CHARACTERISTICS OF IMPERIAL COUNTY, CALIFORNIA

Imperial County is the southeasternmost county in California. This desert area county is bounded on the south by Mexico's Baja California and on the east by the Colorado River and Arizona.

Located in the middle of the county and running from the Mexican border to the Salton Sea is the Imperial Valley--the great winter vegetable producing area of the West. Rainfall is virtually nonexistant in the Valley (averaging 2 to 3 inches per year), and vegetable production is totally dependent upon irrigation water from the Colorado River.

Temperatures in the Valley prohibit many crops from being produced in the summer as readings of 110° to 125° F. are common. Winter temperatures, however, are moderate, excepting for occasional frosts and cold winds. Producers of tender vegetable crops guard against cold and wind damage by the use of brush and paper windbreaks, and individual plant covers. They also adjust the planting dates of the more tender crops so that cold December and January winds and frosts are less destructive.

California leads the Nation in the production of truck crops, ranking first in the production of fresh market vegetables, and second among States producing vegetables for processing in 1962 (see footnote 1, p. 1). The 1959 Census of Agriculture reported vegetables harvested for sale from 657, 344 acres on 5, 856 California farms. The value of these sales was nearly $269 million. 4/

The production of truck crops in Imperial County in 1959 exceeded $30 million or 11.2 percent of the State total. These crops were produced on 59, 353 acres on 336 farms. The average vegetable acreage harvested per farm was 176.6 acres. Sales per acre harvested averaged $508.57 as compared with $408.69 per acre of vegetables for the entire State. This difference of $100 per acre gross income in favor of the Imperial grower stems largely from higher prices received for fresh vegetables during the winter months. Another factor favoring returns to the Imperial grower is that he generally does not produce truck crops for processing. Processed crops usually return a lower price per unit of product than do fresh vegetables.

The $100 per acre greater gross return to the Imperial Valley grower should not be construed to mean that he has a $100 per acre higher net return than the average truck farmer in California. Winter vegetable production is costly. The expense of protecting crops with brush and paper may approach $100 per acre for materials alone (see Tomatoes, staked, table A, page 29). Another cost attendant with protecting crops is the increased use of hand labor--51.5 hours per acre of staked tomates for setting brush and paper.

4/ U. S. Department of Commerce, Census of Agriculture, v.1, pt.48. 1959.

Late in 1959, information regarding the 1958-59 production of truck crops was obtained by interviewing operators of 108 farms. The survey farms represented a 32 percent sample of all farms in Imperial County harvesting truck crops for sale. On the average, the survey farms had 849.3 acres of cropland. Vegetables were grown on 292.7 acres, or about 34 percent of the cropland. Most farms in the Valley produced only one or two truck crops. Table 1 shows the number of farms by acres of cropland and, further, indicates the number of truck crops produced per farm.

The acreage of truck crops harvested per farm in the survey is nearly two-thirds again as large as that on census farms, 292.7 acres and 177.6 acres, respectively. This upward bias is primarily the result of overenumeration of large-scale lettuce farms. More than half of the survey farms raised lettuce, and the average acreage per farm produced was 349.5 acres (table 2). The 1959 census reported lettuce being grown on 39 percent of the vegetable farms with the average acreage being only 240 acres per farm.

This report presents information on six of the most commonly grown vegetables in the Imperial Valley. Separate production practice data are presented for tomatoes staked and unstaked, as the operations and costs of materials used differ widely.

Figure 1

Table 1.--Sample farms: Number, average acreage of cropland, and distribution of truck crops produced by farms in each size group, Imperial County, Calif., 1958-59

Cropland operated (acres)	Farms in size groups	Average acreage of cropland per farm	Distribution of farms, by number of crops produced					
			1	2	3	4	5	6
	Number	Acres	Farms	Farms	Farms	Farms	Farms	Farms
Under 30.0	12	13.9	5	5	1	---	1	---
30.0 to 49.9	9	40.4	4	4	1	---	---	---
50.0 to 69.9	4	56.8	2	2	---	---	---	---
70.0 to 99.9	5	83.0	3	---	2	---	---	---
100.0 to 139.9	4	111.2	3	---	1	---	---	---
140.0 to 179.9	3	153.3	---	1	2	---	---	---
180.0 - 219.9	3	200.0	1	---	---	2	---	---
220.0 - 259.9	4	222.5	2	1	1	---	---	---
260.0 - 499.9	13	375.0	4	3	3	2	---	1
500.0 - 999.9	18	679.8	5	10	3	---	---	---
1,000.0 - 1,999.9	20	1,350.4	9	2	8	1	---	---
2,000.0 and over	13	3,387.4	4	4	3	1	1	---
Total or average	108	849.3	42	32	25	6	2	1

Table 2.--Truck crops grown for fresh market on 108 farms, by acreage harvested, Imperial County, Calif., 1958-59

Crop	Farms producing 1/	Acreage harvested	
		Total	Average per farm
	Number	Acres	Acres
Asparagus	9	909.9	101.1
Cabbage	19	1,189.0	62.6
Cantaloups	19	2,779.0	146.3
Carrots	19	2,510.0	132.1
Lettuce	56	19,573.5	349.5
Dry onions	7	464.0	66.3
Squash	26	315.0	12.1
Tomatoes	34	1,240.5	36.5
Watermelons	19	2,150.0	113.2
Other 2/	---	480.5	---
Total	108	31,611.4	292.7

1/ Number of farms producing does not add to the total because many farms produced more than one crop.

2/ Includes 480.5 acres of cucumbers, sweet peppers, broccoli, eggplant, okra, green onions, and mustard greens for fresh market use. Excluded are 616.6 acres of asparagus, carrots, dry onions, and okra grown primarily for processing.

VEGETABLES FOR FRESH MARKET

Cantaloups

Figure 2 and tables A, B, C, and D present data on cantaloup production on 1,351 acres on 11 farms in 1958-59. The average yield per acre was 10,958 pounds (137 crates of 80 pounds net).

Tractors were used for all cultural operations. While size of tractor was not obtained in the survey, size of equipment used indicates that the average tractor used in land preparation was a 60 to 80 horsepower track-laying tractor. The average size tractor for other operations appears to be about a 3-plow tractor with a drawbar horsepower rating of 20 to 30.

Cantaloups were planted in both the fall and spring. The fall planted cantaloups were protected from frost by the use of paper caps and brush. Spring planting was delayed until danger of frost was past. Harvesting occurred from mid-April through mid-July.

Much of the work done on cantaloups is hand work. Weeding, thinning, hoeing, setting, and removing brush required nearly 80 hours of the 113 used per acre for preharvest work. Harvesting was performed by hand with the only power equipment used being trucks for hauling. Most of the hand operations were performed by Mexican national workers.

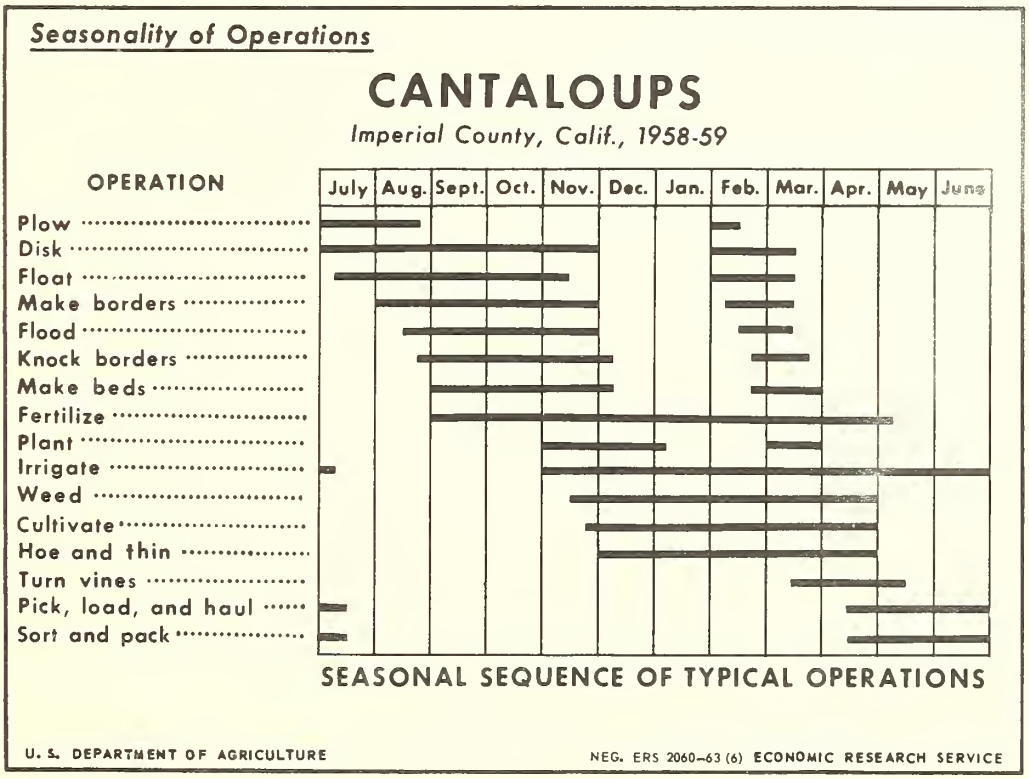

Figure 2

Table A.--Cantaloups: Materials used and contract work hired, averages for 1,351 acres on 11 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	2.95	1.98	5.84	100	5.84
Manure	Ton	3.00	8.67	26.01	4	1.04
Fertilizer nutrients-						
N	Pound	137.00	.125	17.12	96	16.44
P_2O_5	Pound	311.00	.105	32.66	77	25.15
K_2O	Pound	42.00	.070	2.94	41	1.21
Dust, malathion, and sulfur	Pound	117.50	.125	14.69	12	1.76
Hot caps and splints	Thousand	2.33	9.300	21.67	40	8.67
Brush	Bundle	247.00	.160	39.52	6	2.37
Picking sacks	Each	5.67	.50	2.84	4	.11
Packing crates, lids, and labels	Each	137.00	.69	94.53	100	94.53
Irrigation water	Acre-inch	47.65	.17	8.10	100	8.10
Total	---	---	---	---	---	165.22
Contract work hired:						
Plow	Acre	1.0	8.04	8.04	16	1.29
Disk	Acre	2.0	1.16	2.32	9	.21
Float	Acre	1.0	1.25	1.25	5	.06
Make beds	Acre	1.0	6.00	6.00	13	.78
Dust by plane, includes materials	Application	3.4	6.17	20.98	4	.84
Total	---	---	---	---	---	3.18
Total materials and contract work	---	---	---	---	---	1/ 168.40

1/ Average yield per acre - 10,958 pounds. Average cost of materials and contract work per hundredweight - $1.54.

Table B.--Cantaloups: Labor, power, and machinery used in producing and harvesting, averages for 1,351 acres on 11 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Spread manure	Trailer	3.3	0.7	1.0	4	0.1	1/
Plow	4-bot. 20-inch moldboard	.9	.9	1.0	84	.8	0.8
Plow (custom)	3-bot. 20-inch moldboard	.9	.9	1.0	16	.1	.1
Disk	16-foot disk	.5	.5	2.1	91	1.0	1.0
Disk (custom)	18-foot disk	.4	.4	2.0	9	.1	.1
Float	14-foot float	.4	.4	1.0	91	.4	.4
Float (custom)	14-foot float	.4	.4	1.0	5	1/	1/
Make borders	6-foot disk	.2	.2	1.0	100	.2	.2
Flood	---	1.5	---	1.0	100	1.5	---
Knock borders	6-foot disk	.1	.1	1.0	100	.1	.1
Make beds 2/	1-row bedder	.5	.5	1.2	100	.6	.6
Plant	1-row planter	1.0	.5	1.0	92	.9	.5
Plant	---	2.2	---	1.0	8	.2	---
Lay pipe	---	1.6	---	1.0	8	.1	---
Irrigate	---	.9	---	8.1	100	7.3	---
Weed	---	18.3	---	1.0	60	11.0	---
Dust (custom)	Plane	1/	1/	3.4	4	1/	1/
Dust	---	.7	---	3.5	11	.3	---
Cultivate	1-row cultivator	.5	.5	2.4	96	1.2	1.2
Cap plants	---	19.0	---	1.0	40	7.6	---
Lift caps, thin, hoe, and recap	---	23.3	---	1.0	40	9.3	---
Remove caps	---	6.0	---	1.0	40	2.4	---
Set brush	---	80.0	---	1.0	6	4.8	---
Remove brush	---	40.0	---	1.0	6	2.4	---
Fertilize	1-row distributor	.5	.3	1.6	91	.7	.4
Fertilize	---	2.0	---	1.5	9	.3	---
Cultivate and fertilize	1-row cult./attach.	.7	.7	1.0	37	.3	.3
Turn vines	---	20.2	---	2.0	100	40.4	---
Thin and hoe	---	22.7	---	1.0	85	19.3	---
Total	---	---	---	---	---	113.4	5.7
Harvest:							
Pick, load, and haul	2-ton truck	3.7	.6	14.0	100	51.8	8.4
Sort and pack	---	1.7	---	14.0	100	23.8	---
Total	---	---	---	---	---	75.6	8.4
Total preharvest and harvest	---	---	---	---	---	3/ 187.0	3/ 14.1

1/ Less than 0.05 hour. 2/ Includes some custom work.
3/ Average yield per acre = 10,958 pounds. Average labor and power used per hundredweight = 1.72 hours and 0.13 hour, respectively.

Table C.--Cantaloups: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total 1/	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plow	1	0.9	0.9	0.9	0.9
Disk	2	.5	.5	1.0	1.0
Float	1	.4	.4	.4	.4
Make borders	1	.2	.2	.2	.2
Flood	1	1.5	---	1.5	---
Knock borders	1	.1	.1	.1	.1
Make beds	1	.5	.5	.5	.5
Plant	1	1.0	.5	1.0	.5
Irrigate	8	.9	---	7.2	---
Weed	1	18.3	---	18.3	---
Cultivate	2	.5	.5	1.0	1.0
Fertilize	2	.5	.3	1.0	.6
Turn vines	2	20.2	---	40.4	---
Hoe and thin	1	22.7	---	22.7	---
Pick, load, and haul	14	3.7	.6	51.8	8.4
Sort and pack	14	1.7	---	23.8	---
Total	---	---	---	171.8	13.6

1/ Does not include protecting against frost damage, such as capping or brushing.

Table D.--Cantaloups: Distribution of workers performing specified operations, by type of worker on 11 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Spread manure	0	100	0	0	0
Plow	0	50	10	0	40
Disk	8	50	17	0	25
Float	16	46	15	0	23
Make borders	33	34	33	0	0
Flood	2	0	35	63	0
Knock borders	0	50	50	0	0
Make beds	19	65	16	0	0
Plant	8	67	17	8	0
Plant by hand	50	0	25	25	0
Lay pipe	8	0	8	84	0
Irrigate	8	8	17	67	0
Weed	0	0	0	100	0
Dust by plane	0	0	0	0	100
Dust by hand	0	0	0	100	0
Cultivate	33	50	17	0	0
Cap plants	0	0	0	100	0
Lift caps, thin, hoe, and recap	0	0	0	100	0
Remove caps	0	0	0	100	0
Set brush	0	0	0	100	0
Remove brush	0	0	0	100	0
Fertilize	7	36	14	43	0
Fertilize by hand	0	18	9	73	0
Cultivate and fertilize	0	100	0	0	0
Turn vines	0	0	0	100	0
Hoe and thin	0	0	0	100	0
Pick, load, and haul	0	8	0	92	0
Sort and pack	0	0	69	31	0

Carrots

Data in figure 3 and tables A, B, C, and D are based on information obtained covering production of carrots grown for the fresh market on 1,589 acres on 10 farms in winter 1958-59. The average yield per acre was 16.0 tons.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Drawbar horsepower ratings were not obtained in this survey, but size of equipment used indicates that these tractors were 3- and 4-plow tractors with drawbar horsepower ratings of 20 to 40. Tractors used in land preparation were of a track-laying type with drawbar horsepower ratings of 60 to 80.

Growers have made substantial progress in reducing costly labor inputs in producing carrots. Over four-fifths of the acreage was treated to control weeds; 70 percent was oiled, and 13 percent was fumigated. Prior to the use of herbicides, hand weeding required many hours of labor per acre with the operation being performed two or three times. Chemical weed control reduced this operation to a once-over basis, and the bulk of the work became thinning carrots, not pulling weeds.

The entire acreage of carrots on the survey farms was sold prior to harvesting. Farmers did not report harvesting inputs which were incurred by the buyers.

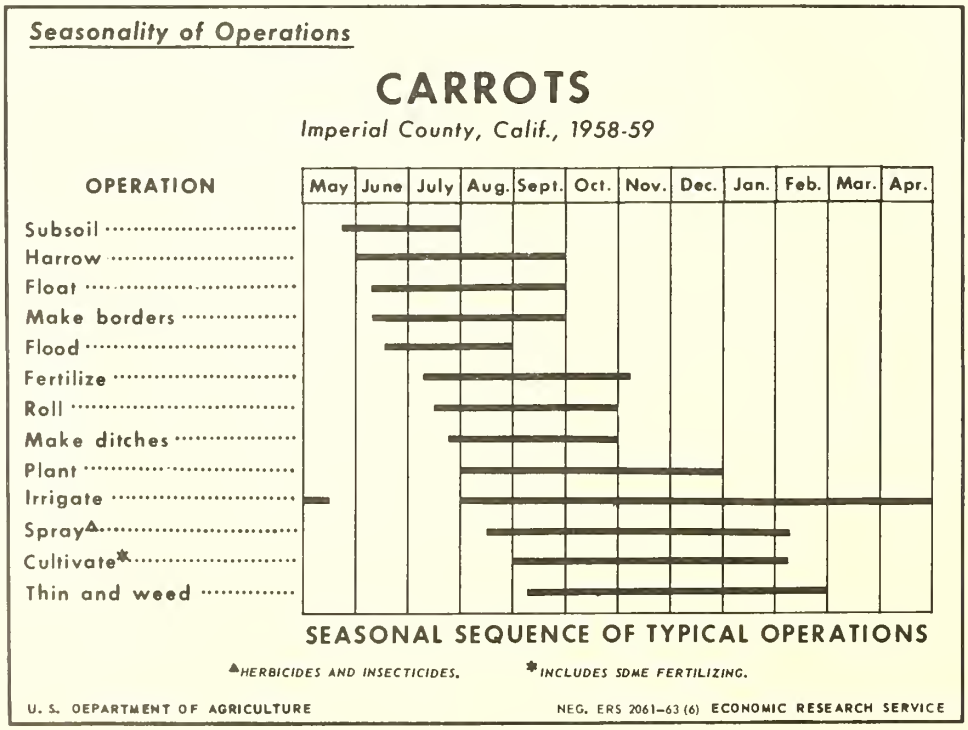

Figure 3

Table A.--Carrots: Materials used and contract work hired, averages for 1,589 acres on 10 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	2.75	1.89	5.20	100	5.20
Fertilizer nutrients –						
N	Pound	117.38	1/	1/	100	25.34
P_2O_5	Pound	170.64	1/	1/	100	
Spray, dieldrin	Gallon	.43	7.10	3.05	9	.27
Spray, terrachlor	Gallon	1.50	3.26	4.89	9	.44
Dust, DDT, and sulfur	Cwt.	.25	5.50	1.38	18	.25
Irrigation	Acre-inch	40.8	.17	6.94	100	6.94
Total	---	---	---	---	---	38.44
Contract work hired:						
Plow, tractor	Acre	1.0	7.50	7.50	7	.52
Disk	Acre	2.0	1.59	3.18	7	.22
Float	Acre	1.6	1.50	2.40	7	.17
Make beds	Acre	1.0	2.70	2.70	7	.19
Roll beds	Acre	1.0	2.00	2.00	3	.06
Make ditches	Acre	1.0	.25	.25	3	.01
Make borders	Acre	1.0	1.36	1.36	7	.10
Knock borders	Acre	1.0	2.00	2.00	3	.06
Fumigate, includes materials	Acre	1.0	28.50	28.50	13	3.70
Plant	Acre	1.0	2.50	2.50	3	.08
Cultivate	Acre	2.0	2.75	5.50	3	.16
Fertilize, injector and 100 lb. NH_3/acre	Acre	2.0	7.50	15.00	40	6.00
Spray, plane, and malathion	Acre	1.0	26.36	26.36	31	8.17
Spray, boom sprayer, and malathion	Acre	1.0	8.14	8.14	64	5.21
Spray, boom sprayer, and oil	Acre	1.0	10.87	10.87	70	7.61
Total	---	---	---	---	---	32.26
Total materials and contract work	---	---	---	---	---	2/ 70.70

1/ Data not available.
2/ Average yield per acre – 16.0 tons. Average cost of materials and contract work per ton – $4.42.

Table B.--Carrots: Labor, power, and materials used, by operation, averages for 1,589 acres on 10 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Plow	3-bot. 18-inch moldboard	0.9	0.9	1.0	33	0.3	0.3
Sub-soil	3-shank 7-foot subsoiler	.9	.9	1.5	78	1.1	1.1
Disk	18-foot offset disk	.6	.6	3.8	100	2.3	2.3
Float	16-foot landplane	.4	.4	1.6	100	.6	.6
Make borders	8-foot border disk	.1	.1	1.0	100	.1	.1
Flood	---	1.8	---	1.0	100	1.8	---
Break borders	8-foot border disk	.1	.1	1.0	22	1/	1/
Fertilize	12-foot spreader	.3	.3	1.5	100	.4	.4
List	4-bot. lister	.3	.3	1.1	63	.2	.2
Roll	4-bed roller	.1	.1	1.0	52	.1	.1
Mulch beds	2-bed mulcher	.4	.4	1.0	10	1/	1/
Make ditches	8-foot grader	.1	.1	1.2	100	.1	.1
Plant and shape beds	4-row seeder and shaper	.7	.6	1.0	100	.7	.6
Lay pipe	---	1.5	---	1.0	30	.4	---
Irrigate	---	1.2	---	6.0	100	7.2	---
Clean and grade ditches	8-foot grader	.1	.1	1.0	15	1/	1/
Cultivate	2-row cultivator	.5	.5	1.6	93	.7	.7
Cultivate and fertilize	2-bed cult./attach.	4.6	4.6	1.5	55	3.8	3.8
Fertilize (custom)	4-bed applicator	.3	.3	1.0	40	.1	.1
Weed	---	10.4	---	1.0	79	8.2	---
Spray oil (custom)	8-bed oiler	.3	.3	1.0	70	.2	.2
Spray malathion (custom)	30-foot boom sprayer	.2	.2	1.0	64	.1	.1
Spray malathion and terrachlor	8-bed boom sprayer	.3	.3	2.0	9	.1	.1
Dust	8-bed duster	.3	.3	1.0	18	.1	.1
Spray (custom)	Plane	1/	1/	1.0	31	1/	1/
Fumigate (custom)	8-bed injector	.4	.4	1.0	13	.1	.1
Total preharvest 2/	---	---	---	---	---	3/ 28.7	3/ 11.0

1/ Less than 0.05 hour.
2/ Production from the entire acreage was sold prior to harvesting. Buyers harvested with their own crews.
3/ Average yield per acre - 16.0 tons. Average labor and power used per ton - 1.8 hours and 0.7 hour, respectively.

Table C.--Carrots: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Subsoil	1	0.9	0.9	0.9	0.9
Disk	4	.6	.6	2.4	2.4
Float	2	.4	.4	.8	.8
Make borders	1	.1	.1	.1	.1
Flood	1	1.8	---	1.8	---
Fertilize	1	.3	.3	.3	.3
List	1	.3	.3	.3	.3
Plant and shape beds	1	.7	.6	.7	.6
Make ditches	1	.1	.1	.1	.1
Irrigate	6	1.2	---	7.2	---
Roll	1	.1	.1	.1	.1
Cultivate	2	.5	.5	1.0	1.0
Cultivate and fertilize	1	4.6	4.6	4.6	4.6
Weed	1	10.4	---	10.4	---
Spray oil (custom)	1	.3	.3	.3	.3
Spray malathion (custom)	1	.2	.2	.2	.2
Total	---	---	---	31.2	11.7

Table D.--Carrots: Distribution of workers performing specified operations, by type of worker on 10 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Plow	25	25	25	0	25
Subsoil	13	67	20	0	0
Disk	12	41	29	0	18
Float	15	39	23	0	23
Make borders	14	28	29	0	29
Flood	0	0	3	97	0
Break borders	33	34	23	0	10
Fertilize	12	25	25	19	19
List	10	75	10	0	5
Mulch beds	0	100	0	0	0
Plant and shape beds	10	40	40	0	10
Make ditches	11	33	34	0	22
Lay pipe	0	0	14	86	0
Irrigate	0	3	4	93	0
Roll	0	94	0	0	6
Clean and grade ditches	0	0	100	0	0
Cultivate	20	20	50	0	10
Cultivate and fertilize	0	80	10	10	0
Weed	0	0	12	88	0
Spray	0	12	0	0	88
Dust	0	100	0	0	0
Spray by plane	0	0	0	0	100
Fumigate	0	0	0	0	100

Lettuce

Figure 4 and tables A, B, C, and D present data on lettuce produced on 11,496 acres on 34 farms. The average yield per acre converted to the most commonly reported unit--48-pound crate--was 418 crates.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for the operations listed. While size of tractor was not obtained in this survey, the size of equipment used indicates that most cultural operations were performed with 3- and 4-plow tractors having drawbar horsepower ratings of 20 to 40. Major land preparation operations were performed by track-laying tractors with drawbar horsepower ratings of 60 to 80.

With the exception of spraying and dusting, most operations were performed by the operator or his crew. Custom operations were restricted to spraying and dusting by plane and heavy land preparation.

Some harvesting was contracted out to crews having their own trucks, stapling machines, etc. However, data obtained on harvesting were difficult to separate on a custom versus farm crew basis, so they are reported here as being performed by the farm crew. No attempt was made to report inputs associated with vacuum cooling and car loading. Harvesting operations typical on these survey farms are as follows: cut, field-pack, load and haul to a vacuum cooler, cool, and load railway cars or trucks. The operations from cooling through shipping, generally are performed by nonfarm workers and were therefore excluded.

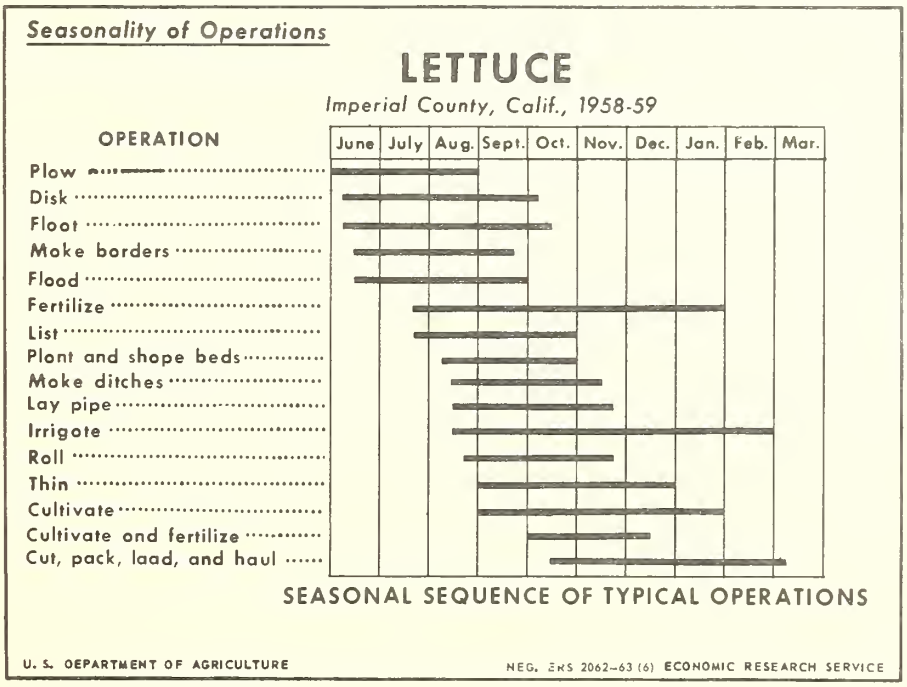

Figure 4

Table A.--Lettuce: Materials used and contract work hired, averages for 11,496 acres on 34 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	2.3	4.02	9.25	100	9.25
Fertilizer nutrients -						
N	Pound	203.1	1/	1/	100	
P_2O_5	Pound	165.8	1/	1/	97	41.27
K_2O	Pound	9.5	1/	1/	4	
Dusting materials	Pound	87.0	.21	18.27	9	1.64
Spray materials 2/	Gallons	6.6	7.08	46.73	16	7.48
Cartons (46-pound)	Each	388.0	.30	116.40	77	89.63
Irrigation water	Acre-inch	32.2	.17	5.47	100	5.47
Total	---	---	---	---	---	154.74
Contract work hired:						
Plow	Acre	1.0	7.03	7.03	10	.70
Disk	Acre	2.0	1.79	3.58	10	.36
Float or landplane	Acre	1.0	1.52	1.52	10	.15
Fertilize, includes fertilizer 3/	Acre	1.0	12.02	12.02	6	.72
Bed	Acre	1.0	2.72	2.72	6	.16
Make borders	Acre	1.0	1.03	1.03	4	.04
Spray by plane, includes materials	Acre	4.9	6.06	29.69	37	10.99
Spray by plane, no materials	Acre	3.2	1.28	4.10	16	.66
Dust by plane, includes materials	Acre	1.8	5.66	10.19	13	1.32
Dust by plane, no materials	Acre	2.0	1.25	2.50	5	.12
Dust by ground duster, includes materials	Acre	7.0	7.83	54.81	2	1.10
Total	---	---	---	---	---	16.32
Total preharvest and harvest	---	---	---	---	---	4/ 171.06

1/ Data not available. 2/ Dry materials converted from pounds to gallons.
3/ Average 220 pounds of 15-30-0.
4/ Average yield per acre - 418 crates (48 pounds). Average cost of material and contract work per crate -$0.41.

Table B.--Lettuce: Labor, power, and machinery used in producing and harvesting, averages for 11,496 acres on 34 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Plow	3-bot. 18-inch moldboard	1.2	1.2	1.0	79	0.9	0.9
Plow (custom)	4-bot. 24-inch moldboard	1.1	1.1	1.0	10	.1	.1
Disk	18-foot offset	.4	.4	2.6	90	.9	.9
Disk (custom)	16-foot offset	.4	.4	2.0	10	.1	.1
Subsoil	3-shank	.9	.9	1.0	19	.2	.2
Landplane	12 x 60-foot landplane	.6	.4	1.6	21	.2	.1
Landplane (custom)	12 x 60-foot landplane	.6	.4	1.0	4	1/	1/
Make borders	6-foot border disk	.1	.1	1.0	96	.1	.1
Make borders (custom)	6-foot border disk	.1	.1	1.0	4	1/	1/
Flood	---	1.6	---	1.0	100	1.6	---
Knock borders	6-foot border disk	.1	.1	1.0	96	.1	.1
Float	14-foot float	.5	.4	1.6	91	.7	.6
Float (custom)	14-foot float	.4	.4	1.0	6	1/	1/
Fertilize	12-foot spreader	.5	.3	2.2	94	1.0	.6
Fertilize (custom)	12-foot spreader	.5	.3	1.0	6	1/	1/
List and fertilize	4-bed lister/attach.	.4	.4	1.0	15	.1	.1
Bed	4-bed lister	.2	.2	1.0	94	.2	.2
Bed (custom)	4-bed lister	.2	.2	1.0	6	1/	1/
Plant and shape beds	2-bed sled planter	.7	.5	1.0	100	.7	.5
Make ditches	8-foot grader	.1	.1	1.6	91	.1	.1
Lay pipe	---	1.1	---	1.0	73	.8	---
Irrigate	---	1.0	---	4.3	100	4.3	---
Roll beds	4-bed roller	.2	.2	1.0	60	.1	.1
Thin	---	31.5	---	1.0	95	29.9	---
Cultivate	2-bed cultivator	.5	.5	2.8	100	1.4	1.4
Cultivate and sidedress	2-bed cultivator/attach.	1.2	.8	2.0	87	2.1	1.4
Weed	---	6.1	---	1.9	48	5.6	---
Hoe	---	11.7	---	1.0	7	.8	---
Spray (custom)	Plane	1/	1/	4.5	49	1/	1/
Dust (custom)	Plane	1/	1/	1.9	18	1/	1/
Dust (custom)	8-bed duster	.2	.2	7.0	2	1/	1/
Total	---	---	---	---	---	52.0	7.5
Harvest:							
Cut, pack, and load by hand, haul by truck	Trucks	29.4	2.1	3.4	2/ 77	77.0	5.5
Total		---	---	---	---	77.0	5.5
Total preharvest and harvest	---	---	---	---	---	3/129.0	3/13.0

1/ Less than 0.05 hour. 2/ Production from remaining acreage sold in the field.
3/ Average yield per acre - 418 crates (48 pounds). Average labor and power used per crate - 0.31 hour and 0.03 hour, respectively.

Table C.--Lettuce: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plow	1	1.2	1.2	1.2	1.2
Disk	3	.4	.4	1.2	1.2
Make borders	1	.1	.1	.1	.1
Flood	1	1.6	---	1.6	---
Knock borders	1	.1	.1	.1	.1
Float	2	.5	.4	1.0	.8
Fertilize	2	.5	.3	1.0	.6
Bed	1	.2	.2	.2	.2
Plant and shape beds	1	.7	.5	.7	.5
Make ditches	2	.1	.1	.2	.2
Lay pipe	1	1.1	---	1.1	---
Irrigate	4	1.0	---	4.0	---
Roll beds	1	.2	.2	.2	.2
Thin	1	31.5	---	31.5	---
Cultivate	3	.5	.5	1.5	1.5
Cultivate and fertilize	2	1.2	.8	2.4	1.6
Cut, pack, load, and haul	3	29.4	2.1	88.2	6.3
Total	---	---	---	136.2	14.5

Table D.--Lettuce: Distribution of workers performing specified operations, by type of worker on 34 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Plow	5	75	10	0	10
Disk	2	93	0	0	5
Subsoil	20	60	20	0	0
Landplane	10	83	2	0	5
Make borders	9	74	9	0	8
Flood	5	5	2	88	0
Knock borders	14	86	0	0	0
Float	11	74	6	0	9
List and fertilize	0	100	0	0	0
Bed	11	78	6	0	5
Roll beds	3	71	26	0	0
Plant	18	69	13	0	0
Fertilize	5	67	8	10	10
Make ditches	10	61	7	22	0
Lay pipe	0	1	2	97	0
Irrigate	5	1	3	91	0
Thin	0	1	2	97	0
Cultivate	12	71	17	0	0
Cultivate and fertilize	13	67	12	8	0
Weed	0	1	3	96	0
Hoe	0	1	0	99	0
Spray by plane	0	0	0	0	100
Dust by plane	0	0	0	0	100
Dust by grounding	0	75	25	0	0
Cut, pack, load, and haul	0	4	11	85	0

Squash

Figure 5 and tables A, B, C, and D present data on the production of squash grown on 166 acres on 14 farms in 1958-59. The average yield per acre was 5,477 pounds or 242 flat crates.

Tractors were the chief source of power on these farms. One farmer used a horse for cultivation. All other squash growers used tractors for mechanized operations. While size of tractor was not obtained, equipment used indicates that the average size tractor was about a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30.

About 40 percent of the acreage was planted late in the fall and required brush cover to protect it from frosts and cold winds.

Squash was grown on small farms, and the operator and his family did considerable work on the enterprise. Operations that could not be handled by the farm family were performed either by custom operators or by Mexican national workers.

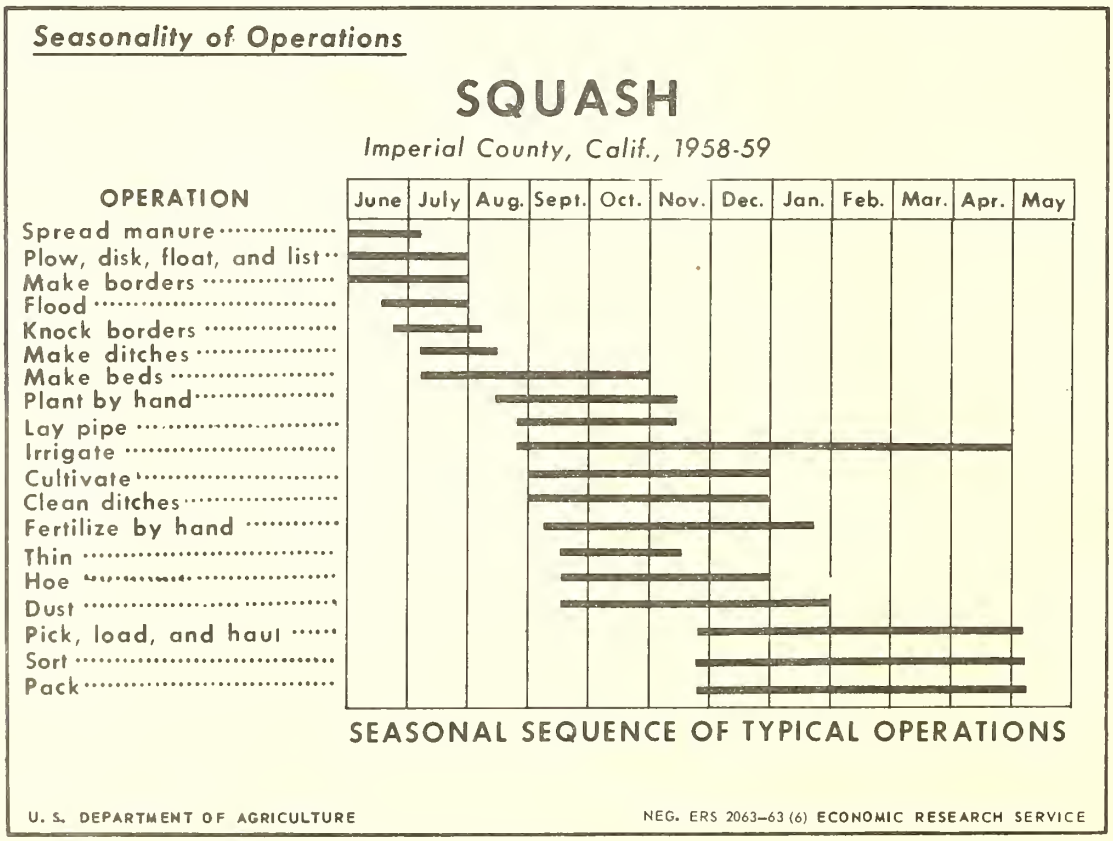

Figure 5

Table A.--Squash: Materials used and contract work hired, averages for 166 acres on 14 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	2.3	1.83	4.21	100	4.21
Steer manure	Ton	2.2	6.10	13.42	52	6.98
Dust	Cwt.	1.2	6.34	7.61	74	5.63
Brush	Bundle	300.0	.18	54.00	40	21.60
Paper	Roll	6.0	7.00	42.00	40	16.80
Wire	Pound	200.0	.14	28.00	7	1.96
Posts	Each	120.0	.12	14.40	7	1.01
Fertilizer nutrients-						
N	Pound	107.0	.12	12.84	88	11.30
P_2O_5	Pound	133.3	.11	14.66	88	12.90
K_2O	Pound	54.5	.07	3.82	41	1.57
Sulfur	Pound	100.0	.08	8.00	12	.96
Irrigation water	Acre-inch	38.0	.17	6.46	100	6.46
Picking boxes	Each	38.0	.12	4.56	35	1.60
Packing flats, liners, and covers	Each	242.0	.33	79.86	100	79.86
Total	---	---	---	---	---	172.84
Contract work hired:						
Plow, disk, and float	Hour	2.3	10.00	23.23	38	8.83
Plow, disk, float, and list	Hour	2.5	10.00	25.00	23	5.75
Make beds	Hour	.9	10.00	9.00	14	1.26
Dust by plane, includes materials	Pound	30.0	.16	4.80	24	1.15
Total	---	---	---	---	---	16.99
Total materials and contract work	---	---	---	---	---	1/ 189.83

1/ Average yield per acre - 5,477 pounds. Average cost of materials and contract work per hundredweight - $3.47.

Table B.--Squash: Labor, power, and machinery used in producing and harvesting, averages for 166 acres on 14 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Spread manure	Wagon	3.4	1.6	1.0	52	1.8	0.8
Plow, disk, and float (custom)	3-bot. plow, 18-ft. disk	2.3	2.3	1.0	38	.9	.9
Plow, disk, float, list (custom)	16-ft. float, 2-row lister	2.5	2.5	1.0	23	.6	.6
Plow	3-bot. 18-inch moldboard	1.2	1.2	1.0	38	.5	.5
Disk	18-ft. disk	.7	.7	1.8	39	.5	.5
Float	16-ft. float	.4	.4	1.0	39	.2	.2
Make beds	1-bed lister	1.6	1.6	1.0	63	1.0	1.0
Make beds (custom)	2-bed lister	.9	.9	1.0	14	.1	.1
Make borders	6-ft. border disk	.6	.6	1.0	100	.6	.6
Flood	---	4.3	---	1.0	100	4.3	---
Knock borders	6-ft. border disk	.4	.4	1.0	100	.4	.4
Make ditches	---	3.1	---	1.0	10	.3	---
Make ditches	1-bot. disk plow	.5	.5	1.0	90	.4	.4
Level beds	1-bed scraper	2.1	2.1	1.0	35	.7	.7
Plant	---	3.1	---	1.0	81	2.5	---
Plant	1-row corn planter	2.5	1.9	1.0	19	.5	.4
Lay pipe	---	4.7	---	1.0	53	2.5	---
Irrigate	---	1.7	---	12.0	100	20.4	---
Cultivate	2-row cultivator	2.2	2.2	1.6	69	2.4	2.4
Cultivate by horse	1-row cultivator	4.4	4.4	1.0	8	.4	.4
Clean ditches	---	.5	---	1.6	69	.6	---
Fertilize	---	3.4	---	1.4	85	4.0	---
Fertilize	1-bed distributor	2.3	1.0	1.2	49	1.4	.6
Cover fertilizer	2-bed cultivator	.6	.6	1.4	23	.2	.2
Set parts and wire	---	19.6	---	1.0	7	1.4	---
Set brush and paper	---	56.5	---	1.0	40	22.6	---
Remove brush and paper	---	12.0	---	1.0	40	4.8	---
Thin and hoe	---	15.0	---	1.0	12	1.8	---
Thin	---	10.4	---	1.0	55	5.7	---
Hoe	---	15.7	---	1.9	51	15.2	---
Weed and thin	---	26.3	---	1.0	9	2.4	---
Weed	---	9.5	---	1.7	14	2.3	---
Dust	---	1.8	---	5.8	60	6.3	---
Dust (custom)	Plane	1/	1/	1.0	24	1/	1/
Dust	---	.3	.3	3.0	14	.1	.1
Total	---	---	---	---	---	109.8	10.8
Harvest:							
Pick, load, and haul	Truck	5.1	.4	22.1	100	112.7	8.8
Sort	---	1.2	---	22.1	100	26.5	---
Pack	---	2.1	---	22.1	100	46.4	---
Total	---	---	---	---	---	185.6	8.8
Total preharvest and harvest	---	---	---	---	---	2/ 295.4	2/ 19.6

1/ Less than 0.5 hour.
2/ Average yield per acre - 5,477 pounds. Average labor and power per hundredweight -5.4 hours and 0.4 hour, respectively.

Table C.--Squash: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Spread manure	1	3.4	1.6	3.4	1.6
Plow, disk, float, and list (custom)	1	2.5	2.5	2.5	2.5
Make borders	1	.6	.6	.6	.6
Flood	1	4.3	---	4.3	---
Knock borders	1	.4	.4	.4	.4
Make ditches	1	.5	.5	.5	.5
Make beds	1	1.6	1.6	1.6	1.6
Plant by hand	1	3.1	---	3.1	---
Lay pipe	1	4.7	---	4.7	---
Irrigate	12	1.7	---	20.4	---
Cultivate	2	2.2	2.2	4.4	4.4
Clean ditches	2	.5	---	1.0	---
Fertilize by hand	1	3.4	---	3.4	---
Thin	1	10.4	---	10.4	---
Hoe	2	15.7	---	31.4	---
Dust	6	1.8	---	10.8	---
Pick, load, and haul	22	5.1	.4	112.2	8.8
Sort	22	1.2	---	26.4	---
Pack	22	2.1	---	46.2	---
Total	---	---	---	287.7	20.4

Table D.--Squash: Distribution of workers performing specified operations, by type of worker on 14 farms, Imperial County, Calif., 1958-59

Operation	Type of worker			
	Operator and unpaid family	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent
Spread manure	18	0	82	0
Plow, disk, and float	0	0	0	100
Plow, disk, float, and list	0	0	0	100
Plow	100	0	0	0
Disk	100	0	0	0
Float	100	0	0	0
Make borders	80	20	0	0
Flood	50	0	50	0
Knock borders	80	0	20	0
Make beds	75	0	0	25
Level beds	62	0	38	0
Plant by hand	27	0	73	0
Plant by machine	100	0	0	0
Make ditches, by hand	0	0	100	0
Make ditches, by machine	70	0	30	0
Lay pipe	25	0	75	0
Irrigate	62	0	38	0
Cultivate	100	0	0	0
Cultivate by horse	100	0	0	0
Clean ditches	100	0	0	0
Fertilize by hand	18	0	82	0
Fertilize by machine	48	0	52	0
Cover fertilizer	100	0	0	0
Set posts and wire	0	0	100	0
Set brush and paper	0	0	100	0
Remove brush and paper	0	0	100	0
Thin and hoe	0	0	100	0
Thin	31	0	69	0
Hoe	0	0	100	0
Weed and thin	40	0	60	0
Weed	0	0	100	0
Dust by hand	38	0	62	0
Dust by machine	100	0	0	0
Dust by plane	0	0	0	100
Pick, load, and haul	8	3	89	0
Sort	0	100	0	0
Pack	11	89	0	0

Tomatoes, Staked

Figure 6 and tables A, B, C, and D present data covering the production of staked tomatoes grown on 148 acres on 8 farms during the 1958-59 crop season. Average yield per acre was 776 - 20-pound flats (7.76 tons).

Land preparation operations were performed by tractor-drawn equipment. Size of tractor was not obtained, but size of equipment used indicates that the average tractor was a 1- or 2-plow tractor with a drawbar horsepower rating of 10 to 20. Plowing, disking, and floating required larger tractors, but these operations were performed by custom operators using track-type tractors having ratings of 60 to 80 horsepower.

The staked tomatoes were grown in the Calipatria-Niland Area at the northern end of the Valley. Winter temperature is less severe close to the Salton Sea than it is further south. Tomatoes cannot stand frost and cold winds, thus, growers plant in the warmest area and protect plantings with brush and paper windbreaks. Producers also burn old rubber tires when frost is likely. Information on the hours used in tire burning was not obtained. Tires were obtained free of charge from service stations and garages. Wind machines were also used in protecting against frost.

Staked tomatoes required tremendous amounts of hand labor. Excluding machine operations, nearly 660 hours of hand labor were used per acre. The largest single use of labor was in harvesting. Picking, alone, took 246 hours per acre. Sorting and packing tomatoes required 165 hours per acre, and staking, setting brush, and brush removal required more than 70 hours.

An interesting point in winter tomato culture is that the August planting in made on the north side of the beds, away from the hot summer sun. When cooler weather comes in the fall the top of the beds are changed by cultivation so that they slope to the south. Thus, the lower winter sun strikes the beds at more nearly a right angle and raises the soil temperature well above that in flat beds.

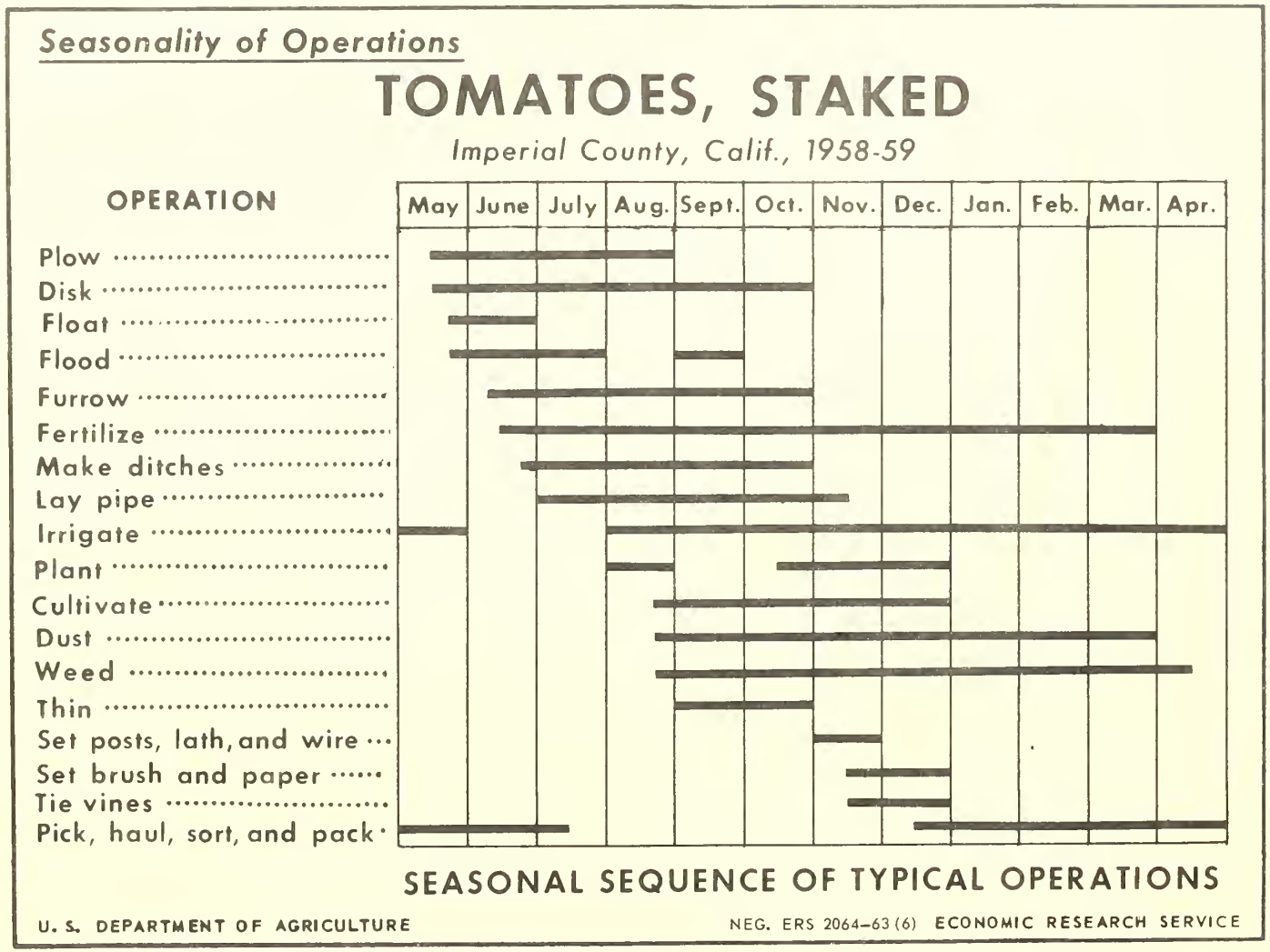
Seasonality of Operations
TOMATOES, STAKED
Imperial County, Calif., 1958-59
OPERATION
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
Plow
Disk
Float
Flood
Furrow
Fertilize
Make ditches
Lay pipe
Irrigate
Plant
Cultivate
Dust
Weed
Thin
Set posts, lath, and wire
Set brush and paper
Tie vines
Pick, haul, sort, and pack
SEASONAL SEQUENCE OF TYPICAL OPERATIONS
U. S. DEPARTMENT OF AGRICULTURE
NEG. ERS 2064-63 (6) ECONOMIC RESEARCH SERVICE

Figure 6

Table A.--Tomatoes, staked: Materials used and contract work hired, averages for 148 acres on 8 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	1.4	10.90	15.26	100	15.26
Manure	Ton	2.0	17.50	35.00	61	21.35
Fertilizer, nutrients-						
N	Pound	111.2	1/	43.58	100	43.58
P_2O_5	Pound	145.1	1/			
K_2O	Pound	98.4	1/			
Dust, materials	Pound	82.7	.13	10.75	100	10.75
Spray, materials	Gallon	8.6	1.91	16.43	22	3.61
Posts	Each	120.0	.12	14.40	100	2/ 4.80
Wire	Pound	133.0	.14	18.62	100	2/ 6.21
Lath	Each	3,000.0	.03	90.00	100	2/ 30.00
Brush	Bundle	300.0	.15	45.00	100	45.00
Paper	Roll	6.0	7.15	42.90	100	42.90
Twine	Bale	1.2	10.00	12.00	50	6.00
Irrigation water	Acre-inch	100.0	.17	17.00	100	17.00
Picking boxes	Each	41.0	.25	10.25	44	4.51
Packing boxes, liners, and covers	Each	776.0	.38	294.88	100	294.88
Total	---	---	---	---	---	545.85
Contract work hired:						
Plow	Acre	1.1	8.34	9.17	100	9.17
Disk	Acre	1.9	2.36	4.48	100	4.48
Float	Acre	1.0	2.82	2.82	73	2.06
Level, 12' landplane	Acre	1.0	5.00	5.00	14	.70
Furrow	Acre	1.0	6.84	6.84	46	3.15
Spread manure	Acre	1.0	5.00	5.00	20	1.00
Make borders and ditches	Acre	1.0	3.00	3.00	6	.18
Dust by plane, application only	Acre	3.0	1.50	4.50	17	.76
Total	---	---	---	---	---	21.50
Total materials and contract work	---	---	---	---	---	3/ 567.35

1/ Data not available. 2/ Assumes a 3-year life.
3/ Average yield per acre - 7.76 tons (776 20-lb. flats). Average cost of materials and contract work per flat - $0.73.

Table B.--Tomatoes, staked: Labor, power, and machinery used in producing and harvesting, averages for 148 acres on 8 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Clean fields, wires, and stakes	---	31.3	---	1.0	22	6.9	---
Plow (custom)	3-bot. 18-inch moldboard	1.0	1.0	1.1	100	1.1	1.1
Disk (custom)	18-foot disk	.2	.2	1.9	100	.4	.4
Float (custom)	16-foot float	.3	.3	1.0	73	.2	.2
Flood	---	2.6	---	1.0	100	2.6	---
Spread manure (custom)	Truck spreader	1.3	1.3	1.0	20	.3	.3
Level (custom)	12-foot landplane	.4	.4	1.0	14	.1	.1
Bed (custom)	2-row lister	1.1	1.1	1.0	46	.5	.5
Bed	2-row lister	.9	.9	1.0	54	.5	.5
Fertilize by hand	---	2.8	---	2.3	95	6.1	---
Fertilize	1-row drill	1.3	1.3	1.4	68	1.2	1.2
Make borders and ditches (custom)	1-row ditcher	.3	.3	1.0	6	1/	1/
Make ditches	1-row ditcher	.3	.3	1.0	64	.2	.2
Plant	1-row hand planter	4.0	---	1.0	86	3.4	---
Plant	1-row tractor seeder	1.1	.6	1.0	14	.2	.1
Lay pipe	---	3.4	---	1.0	66	2.2	---
Irrigate 2/	---	1.4	---	13.9	100	19.5	---
Cultivate	1-row cultivator	1.3	1.3	3.9	86	4.4	4.4
Cultivate and fertilize	1-row cult./attach.	3.8	3.8	1.0	14	.5	.5
Cultivate and fertilize	---	10.9	---	2.0	14	3.1	---
Dust	---	1.3	---	4.0	95	4.9	---
Dust (custom)	Plane	1/	1/	3.0	17	1/	1/
Thin	---	24.0	---	1.0	73	17.5	---
Thin and weed	---	22.6	---	1.0	44	9.9	---
Hoe	---	24.0	---	2.0	10	4.8	---
Spray	---	2.2	---	6.6	22	3.2	---
Set posts, lath, and wire	---	23.6	---	1.0	100	23.6	---
Set brush and paper	---	31.5	---	1.0	100	31.5	---
Tie vines	---	19.1	---	1.0	63	12.0	---
Sucker and tie vines	---	25.9	---	1.6	47	19.5	---
Cover plants with dirt 3/	---	13.3	---	1.0	14	1.9	---
Weed	---	16.6	---	5.0	64	53.1	---
Set up and operate wind machines	Wind machine	.7	.7	1.0	17	.1	.1
Remove brush and paper	---	20.0	---	1.0	100	20.0	---
Total	---	---	---	---	---	255.4	9.6
Harvest:							
Pick	---	10.1	---	24.4	100	246.4	---
Haul	Pick-up truck	1.1	1.1	24.4	100	26.8	26.8
Sort	---	3.7	---	24.4	100	90.3	---
Pack	---	3.1	---	24.4	100	75.6	---
Total	---	---	---	---	---	439.1	26.8
Total preharvest and harvest	---	---	---	---	---	4/ 694.5	4/ 36.4

1/ Less than 0.05 hour.
2/ Includes some fertilization.
3/ For protection against frost.
4/ Average yield per acre - 7.76 tons (776 - 20-lb. flats). Average labor and power hours per flat -0.89 hour and 0.05 hour, respectively.

Table C.--Tomatoes, staked: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plow	1	1.0	1.0	1.0	1.0
Disk	2	.2	.2	.4	.4
Float	1	.3	.3	.3	.3
Flood	1	2.6	---	2.6	---
Bed	1	.9	.9	.9	.9
Fertilize, by hand	2	2.8	---	5.6	---
Fertilize	1	1.3	1.3	1.3	1.3
Make ditches	1	.3	.3	.3	.3
Plant by hand seeder	1	4.0	---	4.0	---
Lay pipe	1	3.4	---	3.4	---
Irrigate	14	1.4	---	19.6	---
Cultivate	4	1.3	1.3	5.2	5.2
Dust by hand blower	4	1.3	---	5.2	---
Thin	1	24.0	---	24.0	---
Set posts, lath, and wire	1	23.6	---	23.6	---
Set brush and paper	1	31.5	---	31.5	---
Tie vines	1	19.1	---	19.1	---
Weed	5	16.6	---	83.0	---
Remove brush and paper	1	20.0	---	20.0	---
Pick	24	10.1	---	242.4	---
Haul	24	1.1	1.1	26.4	26.4
Sort	24	3.7	---	88.8	---
Pack	24	3.1	---	74.4	---
Total	---	---	---	683.0	35.8

Table D.--Tomatoes, staked: Distribution of workers performing specified operations, by type of worker on 8 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Plow	0	0	0	0	100
Disk	0	0	0	0	100
Float	0	0	0	0	100
Flood	44	0	11	45	0
Spread manure	0	0	0	0	100
Level	0	0	0	0	100
Bed	67	0	0	16	17
Fertilize by hand	10	0	5	85	0
Fertilize	12	0	5	83	0
Make borders and ditches	0	0	0	0	100
Make ditches	0	0	100	0	0
Plant by hand	100	0	0	0	0
Plant by tractor	100	0	0	0	0
Set pipe	0	0	0	100	0
Irrigate	38	0	8	54	0
Cultivate	60	20	20	0	0
Cultivate and fertilize	0	0	100	0	0
Cultivate and fertilize by hand	20	0	0	80	0
Dust	21	0	0	79	0
Dust by plane	0	0	0	0	100
Thin	9	0	11	80	0
Thin and weed	0	0	0	100	0
Hoe	29	0	28	43	0
Spray	0	0	14	86	0
Set posts, lath, and wire	11	0	4	85	0
Brush and paper	0	0	0	100	0
Tie vines	4	0	16	80	0
Sucker	1	0	8	91	0
Cover plants with dirt	20	0	0	80	0
Weed	4	0	0	96	0
Set up and operate wind machines	25	0	0	75	0
Remove brush and paper	0	0	0	100	0
Pick	0	0	22	78	0
Haul	50	0	50	0	0
Sort	0	0	100	0	0
Pack	0	0	100	0	0

Tomatoes, Unstaked

Figure 7 and tables A, B, C, and D present data on unstaked tomatoes grown for the fresh market on 268 acres on 9 farms in 1958-59. The average yield per acre was 547 lugs of approximately 20 to 22 pounds, each.

Size of tractor was not obtained in this survey, but considering the size of equipment used, the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Some growers chose to contract out the land preparation jobs which required heavy equipment. Plowing, disking, and floating were operations commonly contracted.

The growing of tomatoes during the winter months can be a gamble, even in lower California. Growers frequently use brush and paper for protection against frost and wind damage. Others use wind machines to try to combat frost. Still others gamble that the weather will be favorable. On these 9 farms, windbreaks were used on 41 percent of the acreage. Paper hot caps covered plants on 39 percent of the acreage (20 of the 41 percent protected by brush) and wind machines were set up on 9 percent of the acres. The remaining 31 percent of the acreage was not protected at all.

Yield per acre of unstaked tomatoes average 229 lugs, or 2.29 tons, lower than tomatoes that were staked and protected from cold winds by brush and paper. However, the labor input per acre of unstaked tomatoes was 334.5 hours less than that incurred on the staked tomatoes.

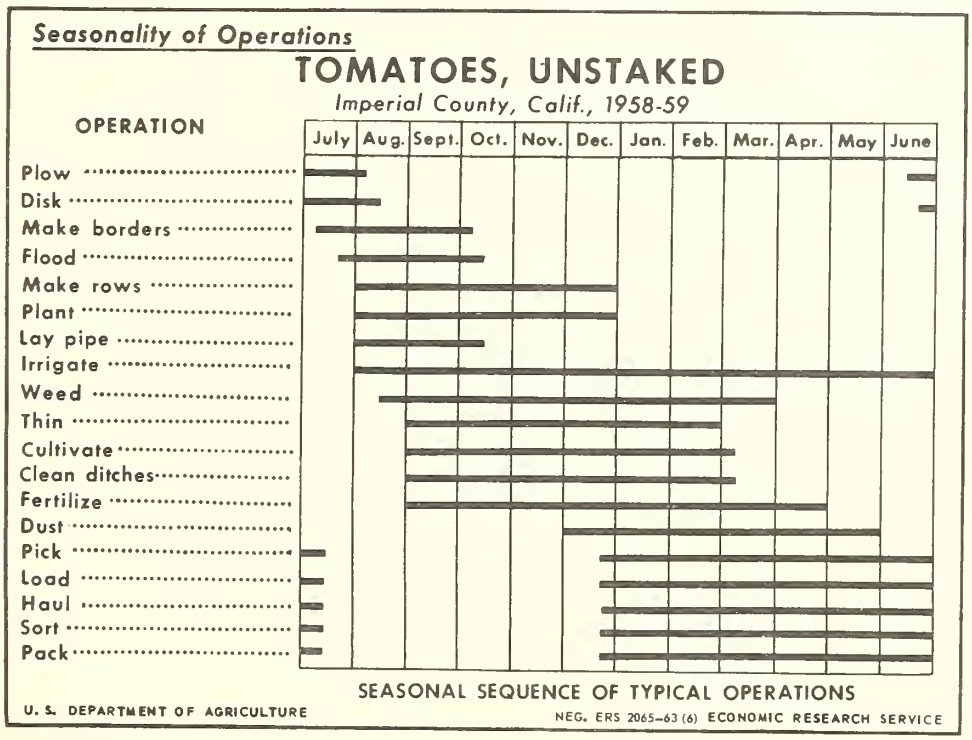

Figure 7

Table A.--Tomatoes, unstaked: Materials used and contract work hired, averages for 268 acres on 9 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Fertilizer nutrients -						
N	Pound	84.8	0.11	9.33	82	7.65
P_2O_5	Pound	113.2	.10	11.32	96	10.87
K_2O	Pound	36.1	.06	2.17	76	1.65
Manure	Ton	3.7	12.73	47.10	38	17.90
Seed	Pound	1.1	10.20	11.22	102	11.44
Dust, assorted	Pound	74.0	.16	11.84	91	10.77
Spray, hormone	Applic.	4.0	8.00	32.00	9	2.88
Paper hot caps	Thous.	2.5	8.50	21.25	41	8.71
Brush and paper	Acre	1.0	52.17	52.17	39	20.35
Picking boxes	Each	37.0	.25	9.25	54	5.00
Packing lugs, papers, and covers	Each	547.0	.37	202.39	100	202.39
Irrigation water	Acre-inch	40.0	.17	6.80	100	6.80
Total	---	---	---	---	---	306.41
Contract work hired:						
Plow	Acre	1.0	6.50	6.50	63	4.09
Disk	Acre	2.0	1.00	2.00	63	1.26
Float	Acre	1.0	2.10	2.10	40	.84
Spread manure	Acre	1.0	6.00	6.00	38	2.28
Dust, plane applic. only	Applic.	4.6	1.38	6.35	20	1.27
Total	---	---	---	---	---	9.74
Total materials and contract work	---	---	---	---		1/ 316.15

1/ Average yield per acre - 547 lugs (20 pounds). Average cost of materials and contract work per lug - $0.58.

Table B.--Tomatoes, unstaked: Labor, power, and machinery used in producing and harvesting, averages for 268 acres on 9 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Spread manure (custom)	Truck	1.3	1.3	1.0	38	0.5	0.5
Plow	3-bot. 18-inch moldboard	1.3	1.3	1.0	32	.4	.4
Plow (custom)	3-bot. 18-inch moldboard	1.1	1.1	1.0	63	.7	.7
Disk	14-foot offset	.6	.6	2.4	37	.5	.5
Disk (custom)	14-foot offset	.6	.6	2.0	63	.8	.8
Make borders	Border disk	.2	.2	1.0	77	.2	.2
Flood	---	3.8	---	1.0	77	2.9	---
Float	16-foot float	.3	.3	1.1	25	.1	.1
Float (custom)	16-foot float	.3	.3	1.1	40	.1	.1
Make beds	1-row lister	.8	.8	1.0	100	.8	.8
Plant	2-row planter	.8	.5	1.0	62	.5	.3
Plant	1-row handplanter	2.1	---	1.0	38	.8	---
Lay pipe	---	1.3	---	1.0	100	1.3	---
Irrigate	---	1.4	---	11.9	100	16.7	---
Dust	4-row duster	.1	.1	1.0	19	1/	1/
Dust (custom)	Plane	1/	1/	4.6	20	1/	1/
Dust	Knapsack duster	1.2	---	3.8	72	3.3	---
Spray	Hand sprayer	2.2	---	4.0	9	.8	---
Hoe	---	6.4	---	1.0	37	2.4	---
Weed	---	10.0	---	1.2	50	6.0	---
Thin	---	16.0	---	1.0	63	10.1	---
Cultivate	2-row cultivator	.5	.5	2.3	85	1.0	1.0
Cultivate and fertilize	1-row cult. /attach.	2.1	2.1	1.5	41	1.3	1.3
Fertilize	---	2.2	---	2.1	61	2.8	---
Fertilize	2-row distributor	.7	.4	1.2	52	.4	.2
Transplant	---	3.0	---	1.0	37	1.1	---
Cap	---	29.4	---	1.0	41	12.1	---
Set brush and paper	---	24.0	---	1.0	39	9.4	---
Lift caps, thin, and weed	---	48.0	---	1.0	41	19.7	---
Set wind machine	---	.7	---	1.0	9	.1	---
Clean ditches	---	1.6	---	2.0	100	3.2	---
Remove caps	---	11.6	---	1.0	35	4.1	---
Remove brush and paper	---	12.5	---	1.0	41	5.1	---
Total	---	---	---	---	---	109.2	6.9
Harvest:							
Pick	---	9.6	---	15.2	100	145.9	---
Load	---	1.3	---	15.2	100	19.8	---
Haul	1 1/2-ton truck	.6	.6	15.2	100	9.1	9.1
Sort	---	3.0	---	15.2	100	45.6	---
Pack	---	2.3	---	15.2	100	30.4	---
Total	---	---	---	---	---	250.8	9.1
Total preharvest and harvest	---	---	---	---	---	2/ 360.0	2/ 16.0

1/ Less than 0.05 hour.
2/ Average yield per acre 547 lugs (20 pounds). Average labor and power used per lug - 0.66 hour and .03 hour, respectively.

Table C.--Tomatoes, unstaked: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plow (custom)	1	1.1	1.1	1.1	1.1
Disk (custom)	2	.6	.6	1.2	1.2
Make borders	1	.2	.2	.2	.2
Flood, hand	1	3.8	---	3.8	---
Make beds	1	.8	.8	.8	.8
Plant	1	.8	.5	.8	.5
Lay pipe, hand	1	1.3	---	1.3	---
Irrigate, hand	12	1.4	---	16.8	---
Dust, hand	4	1.2	---	4.8	---
Weed, hand	1	10.0	---	10.0	---
Thin, hand	1	16.0	---	16.0	---
Cultivate	2	.5	.5	1.0	1.0
Fertilize, hand	2	2.2	---	4.4	---
Fertilize	1	.7	.4	.7	.4
Clean ditches, hand	2	1.6	---	3.2	---
Pick	15	9.6	---	144.0	---
Load	15	1.3	---	19.5	---
Haul	15	.6	.6	9.0	9.0
Sort	15	3.0	---	45.0	---
Pack	15	2.3	---	34.5	---
Total	---	---	---	318.1	14.2

Table D.--Tomatoes, unstaked: Distribution of workers performing specified operations, by type of worker on 9 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Spread manure	0	0	0	0	100
Plow	20	0	40	0	40
Disk	0	40	10	0	50
Make borders	0	0	100	0	0
Flood	19	0	0	81	0
Float	0	25	37	0	38
Make beds	33	25	34	8	0
Plant, hand	37	0	0	63	0
Plant, machine	0	22	78	0	0
Lay pipe	0	0	31	69	0
Irrigate	19	0	0	81	0
Dust, hand	26	0	32	42	0
Dust, plane	0	0	0	0	100
Dust, machine	0	100	0	0	0
Spray	0	0	0	100	0
Hoe	0	0	0	100	0
Weed	0	0	0	100	0
Thin	0	0	0	100	0
Cultivate	17	25	58	0	0
Cultivate and fertilize	50	50	0	0	0
Fertilize, hand	11	0	31	58	0
Fertilize, machine	39	0	0	61	0
Transplant	0	0	0	100	0
Cap	0	0	0	100	0
Set brush and paper	0	0	0	100	0
Lift caps, thin, and weed	0	0	0	100	0
Set wind machine	0	25	0	75	0
Clean ditches	0	0	0	100	0
Remove caps	0	0	0	100	0
Remove brush and paper	0	0	0	100	0
Pick	0	0	0	100	0
Load	0	0	71	29	0
Haul	0	100	0	0	0
Sort	0	0	100	0	0
Pack	0	0	100	0	0

Watermelons

Data presented in figure 8 and in tables A, B, C, and D are based on information obtained covering production of watermelons on 887 acres on 11 farms, in 1958-59. The yield per acre averaged 10.6 tons.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Size of tractor was not obtained, but size of equipment used indicates that the average tractor was about a 3-bottom tractor with a drawbar horsepower rating of 20 to 30.

Watermelons grown in the Imperial Valley are usually planted in November and December and, thus, must be protected from frosts and from desiccation by winds. Hot caps were used to protect plants on 87 percent of the acreage. In addition, brush was used as a windbreak on 40 percent of the acreage. Growers operating about 8 percent of the acreage did not attempt to protect their plants with either brush or caps. Approximately half of the preharvest labor used on watermelons was devoted to protecting plants from damage by frost and wind.

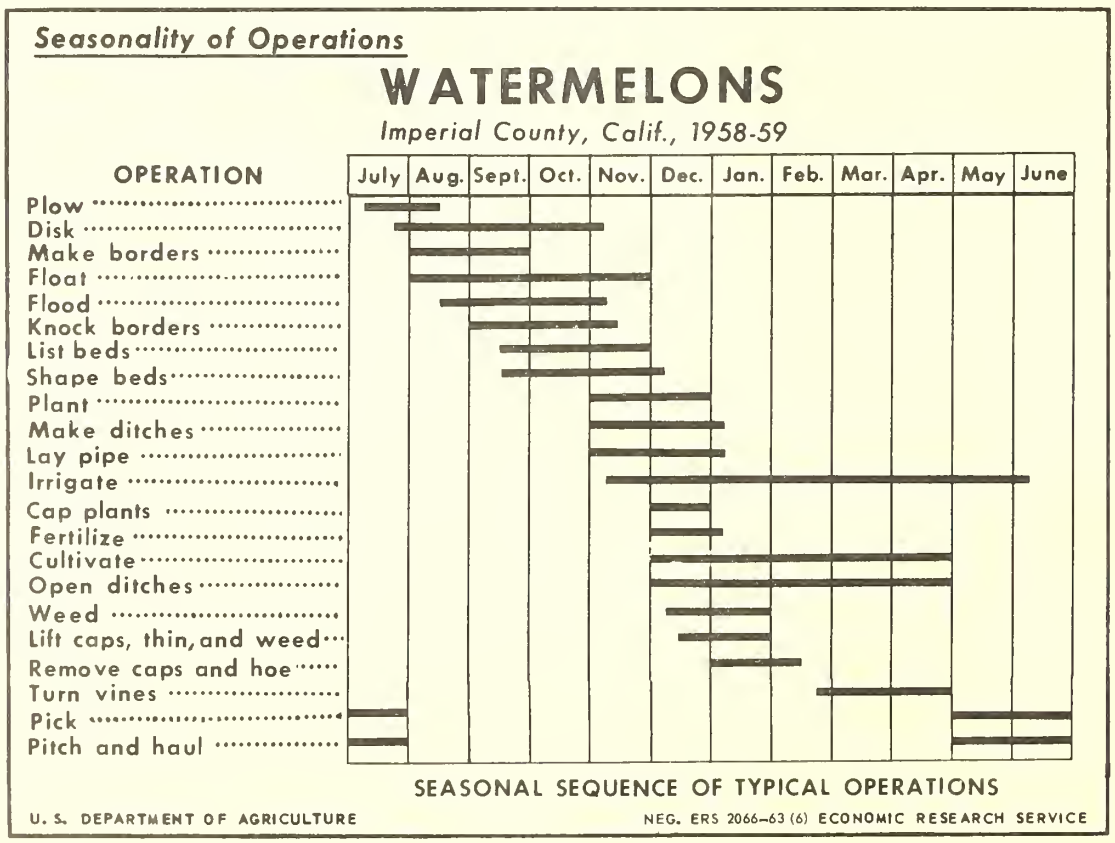

Figure 8

Table A.--Watermelons: Materials used and contract work hired, averages for 887 acres on 11 farms, Imperial County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	1.8	1.83	3.29	100	3.29
Fertilizer nutrients –						
N	Pound	104.5	.10	10.45	100	10.45
P_2O_5	Pound	135.8	.11	14.94	100	14.94
K_2O	Pound	14.1	.07	.99	62	.61
Dust	Pound	42.9	.15	6.44	29	1.87
Caps and splints	Thousand	9.1	9.87	89.82	87	78.14
Brush	Bundle	23.0	.15	3.45	40	1.38
Irrigation water	Acre-inch	39.6	.17	6.73	100	6.73
Total	---	---	---	---	---	117.41
Contract work hired:						
Plow	Acre	1.0	7.86	7.86	51	4.01
Disk	Acre	2.0	1.95	3.90	46	1.79
Float	Acre	1.5	1.68	2.52	46	1.16
Make beds	Acre	1.0	5.62	5.62	37	2.08
Make borders	Acre	1.0	.71	.71	32	.23
Knock borders	Acre	1.0	.64	.64	32	.20
Fertilize, application only	Acre	1.0	2.00	2.00	9	.18
Spread manure, includes materials	Ton	21.4	2.50	53.50	23	12.30
Cultivate and fertilize, no materials	Acre	1.0	2.50	2.50	9	.22
Dust by plane, includes dust	Acre	2.9	5.96	17.28	37	6.39
Dust by plane, no materials	Acre	3.0	1.50	4.50	8	.36
Load and haul	Ton	10.6	2.50	26.50	37	9.80
Harvest and haul	Ton	8.2	14.53	119.15	26	30.98
Total	---	---	---	---	---	69.70
Total materials and contract work	---	---	---	---	---	1/ 187.11

1/ Average yield per acre – 10.6 tons. Average cost of materials and contract work per ton – $17.65.

Table B.--Watermelons: Labor, power, and machinery used in producing and harvesting, averages for 887 acres on 11 farms, Imperial County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Plow	3-bottom 18-inch plow	0.9	0.9	1.0	34	0.3	0.3
Plow (custom)	4-bottom 18-inch plow	.7	.7	1.0	51	.4	.4
Disk	16-foot tandem	.2	.2	2.6	54	.3	.3
Disk (custom)	16-foot tandem	.2	.2	2.0	46	.2	.2
Harrow	9-foot spike harrow	.3	.3	1.3	31	.1	.1
Float	15-foot float	.1	.1	1.4	46	.1	.1
Float (custom)	12-foot float	.2	.2	1.5	46	.1	.1
Flood	---	1.5	---	1.0	92	1.4	---
Make borders	8-foot border disk	.1	.1	1.0	60	.1	.1
Make borders (custom)	8-foot border disk	.1	.1	1.0	32	1/	1/
Knock borders	8-foot border disk	.1	.1	1.0	60	.1	.1
Knock borders (custom)	8-foot border disk	.1	.1	1.0	32	1/	1/
List beds	1-bed lister	.6	.6	1.0	63	.4	.4
List beds (custom)	1-row bedder	.3	.3	1.0	37	.1	.1
Shape beds	1-row vee level	.7	.7	1.0	76	.5	.5
Make ditches	8-foot grader	.1	.1	1.4	76	.1	.1
Lay pipe	---	.9	---	1.0	75	.7	---
Plant	---	1.4	---	1.0	100	1.4	---
Irrigate	---	1.4	---	6.7	100	9.4	---
Cap plants	---	9.3	---	1.0	87	8.1	---
Fertilize	10-foot spreader	.4	.3	1.2	91	.4	.3
Fertilize (custom)	10-foot spreader	.4	.3	1.0	9	1/	1/
Spread manure (custom)	Truck spreader	1.0	1.0	1.0	23	.2	.2
Cultivate and fertilize (custom)	1-row cultivator/attach.	.7	.7	1.0	9	.1	.1
Cultivate	1-row cultivator	.4	.4	5.0	100	2.0	2.0
Weed	---	6.0	---	1.0	17	1.0	---
Lift caps, thin, and weed	---	9.9	---	1.0	87	8.6	---
Remove caps and hoe	---	7.6	---	1.0	87	6.6	---
Set brush	---	5.1	---	1.0	40	2.0	---
Open ditches	8-foot grader	.2	.2	5.0	100	1.0	1.0
Turn vines	---	2.8	---	2.3	100	6.4	---
Dust	---	.9	---	1.0	29	.3	---
Dust (custom)	Plane	1/	1/	3.0	30	1/	1/
Cover melons with vines	---	4.4	---	1.4	32	2.0	---
Total	---	---	---	---	---	54.4	6.4
Harvest:							
Pick	---	2.9	---	4.7	51	7.0	---
Pitch and haul	Trucks	6.8	3.6	4.7	14	4.5	2.4
Pitch and haul (custom)	Trucks	4.9	3.0	4.7	37	8.5	5.2
Pick, and haul (custom)	Trucks	4.7	2.8	3.7	26	4.5	2.7
Total 2/	---	---	---	---	---	24.5	10.3
Total preharvest and harvest	---	---	---	---	---	3/ 78.9	3/ 16.7

1/ Less than 0.1 hour.
2/ Excludes labor input on 23 percent of the acreage as production from this portion was sold in the field.
3/ Average yield per acre - 10.6 tons. Average labor and power used per ton - 7.44 hours and 1.58 hours, respectively.

Table C.--Watermelons: Usual labor and power inputs, Imperial County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plow (custom)	1	0.7	0.7	0.7	0.7
Disk	3	.2	.2	.6	.6
Float	1	.2	.2	.2	.2
Flood	1	1.5	---	1.5	---
Make borders	1	.1	.1	.1	.1
Knock borders	1	.1	.1	.1	.1
List beds	1	.6	.6	.6	.6
Shape beds	1	.7	.7	.7	.7
Make ditches	1	.1	.1	.1	.1
Lay pipe	1	.9	---	.9	---
Plant	1	1.4	---	1.4	---
Irrigate	7	1.4	---	9.8	---
Cap plants	1	9.3	---	9.3	---
Fertilize	1	.4	.3	.4	.3
Weed	1	6.0	---	6.0	---
Lift caps, thin, and weed	1	9.9	---	9.9	---
Remove caps and hoe	1	7.6	---	7.6	---
Cultivate	5	.4	.4	2.0	2.0
Open ditches	5	.2	.2	1.0	1.0
Turn vines	2	2.8	---	5.6	---
Pick	5	2.9	---	14.5	---
Pitch and haul (custom)	5	4.9	3.0	24.5	15.0
Total	---	---	---	97.5	21.4

Table D.--Watermelons: Distribution of workers performing specified operations, by type of worker on 11 farms, Imperial County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Plow	8	42	8	0	42
Disk	9	46	9	0	36
Harrow	18	78	4	0	0
Float	20	40	10	0	30
Flood	0	0	0	100	0
Make borders	10	40	10	0	40
Knock borders	20	40	0	0	40
List beds	20	40	0	0	40
Shape beds	17	22	17	44	0
Make ditches	9	73	0	18	0
Lay pipe	0	0	14	86	0
Plant	6	2	26	66	0
Irrigate	0	0	17	83	0
Cap plants	0	0	42	58	0
Fertilize	5	39	6	28	22
Spread manure	0	0	0	0	100
Cultivate and fertilize	0	0	0	0	100
Cultivate	23	69	8	0	0
Weed	0	0	33	67	0
Lift caps, thin, and weed	0	0	33	67	0
Remove caps and hoe	0	0	12	88	0
Set brush	0	0	0	100	0
Open ditches	0	0	100	0	0
Turn vines	0	0	17	83	0
Dust	0	0	0	100	0
Dust by plane	0	0	0	0	100
Cover melons with vines	0	0	100	0	0
Pick 1/	0	0	43	47	0
Pitch and haul	0	30	21	49	0
Pitch and haul (custom)	0	0	0	0	100
Pick, pitch, and haul (custom)	0	0	0	0	100

1/ Does not add to 100 percent, as 10 percent of the pickers were domestic migratory workers.